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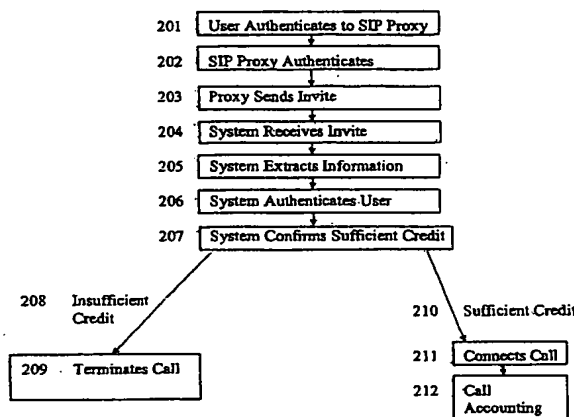
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(54) Title: VOICE OVER INTERNET PROTOCOL SYSTEM AND METHOD



(57) Abstract: A system and method for connecting a Voice Over Internet Protocol call with a Public Switched Telephone Network in one stage, are described. The system and method includes receiving a Session Initiation Protocol invite from a Session Initiation Protocol proxy (204), extracting from the Session Initiation Protocol invite access and destination codes (205), further extracting from the Session Initiation Protocol invite a subscriber's Session Initiation Protocol number, the Session Initiation Protocol proxies Internet Protocol address and the Session Initiation Protocol proxies Fully Qualified Domain Name. The system and method also includes authenticating (206) Voice Over Internet Protocol caller by comparing the extracted subscriber's Session Initiation Protocol number, Session Initiation Protocol proxies Internet Protocol address and the Session Initiation Protocol proxies Fully Qualified Domain Name with previously stored data and further authenticating the call by comparing the extracted access-code with previously stored data. The Voice Over Internet Protocol and Public Switched Telephone Network are connected if the comparisons match and the extracted subscriber's Session Initiation Protocol number has an associated monetary credit (209). The system and method also include accounting for the cost of the call and deducting the cost from the associated monetary credit (212).

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VOICE OVER INTERNET PROTOCOL SYSTEM AND METHOD

FIELD OF THE INVENTION

This invention relates to a method of connecting a Voice Over Internet Protocol ("VOIP") call to a traditional Public Switched Telephone Network ("PSTN"). In particular to a system and method allowing one stage connection, authentication and prepayment for the interconnection using the Session Initiation Protocol ("Session Initiation Protocol ").

BACKGROUND

The Session Initiation Protocol ("SIP") is described in RFC3261 as an "application-layer control protocol that can establish, modify, and terminate multimedia sessions (conferences) such as Internet telephony calls".

The Session Initiation Protocol does not however provide for the use of prepaid termination of Voice Over Internet Protocol calls to the switched telephone network. In particular there is no method to allow one stage connection, authentication and prepayment of the termination.

Present systems require that a user authenticate to a Session Initiation Protocol service provider then authenticate to the prepaid or postpaid provider of termination services. This is usually done using at least one and usually two codes provided on a prepaid card. It would be desirable to provide a system and method allowing one stage connection, authentication and prepayment for connection to the public switched telephone network to avoid the need to authenticate more than once.

SUMMARY OF THE INVENTION

It is an object of the present invention to overcome the above disadvantages or at least provide the public or industry with useful choice.

5 It is a further object of the present invention to provide a system and method allowing one stage connection, authentication and prepayment for the termination of a Voice Over Internet Protocol call with the Public Switched Telephone Network.

Accordingly in a first embodiment, the present invention consists in a method of connecting a Voice Over Internet Protocol call with a Public Switched
10 Telephone Network including the steps of:

receiving a Session Initiation Protocol invite from a Session Initiation Protocol proxy;

extracting from said Session Initiation Protocol invite call destination codes;

15 further extracting from said Session Initiation Protocol invite a subscribers Session Initiation Protocol number, said Session Initiation Protocol proxies Internet Protocol address and said Session Initiation Protocol proxies Fully Qualified Domain Name;

20 authenticating Voice Over Internet Protocol caller by comparing said extracted subscribers Session Initiation Protocol number, Session Initiation Protocol proxies Internet Protocol address and Session Initiation Protocol proxies Fully Qualified Domain Name with previously stored data; and

connecting said Voice Over Internet Protocol and Public Switched Telephone Network if said comparisons match and said extracted subscribers Session Initiation Protocol number has an associated monetary credit.

Preferably said method further including the steps of:

5 extracting from said Session Initiation Protocol invite an access code;
and

further authenticating said call by comparing said extracted access code with previously stored data.

10 Preferably said method further including the step of accounting for the cost of the call and deducting said cost from said associated monetary credit.

Preferably said method further including the step of terminating said call if user has no associated monetary credit left.

15 In a second embodiment, the present invention consists in a system for connecting a Voice Over Internet Protocol call with a Public Switched Telephone Network including:

means for receiving a Session Initiation Protocol invite from a Session Initiation Protocol proxy;

means for extracting from said Session Initiation Protocol invite call destination codes;

20 means for further extracting from said Session Initiation Protocol invite a subscribers Session Initiation Protocol number, said Session Initiation

Protocol proxies Internet Protocol address and said Session Initiation Protocol proxies Fully Qualified Domain Name;

means for authenticating Voice Over Internet Protocol caller by comparing said extracted subscribers Session Initiation Protocol number, Session Initiation Protocol proxies Internet Protocol address and Session Initiation Protocol proxies Fully Qualified Domain Name with previously stored data; and

means for connecting said Voice Over Internet Protocol and Public Switched Telephone Network if said comparisons match and said extracted subscribers Session Initiation Protocol number has an associated monetary credit.

Preferably said system further including:

means for extracting from said Session Initiation Protocol invite an access code; and

means for further authenticating said call by comparing said extracted access code with previously stored data.

Preferably said system further including means for accounting for the cost of the call and deducting said cost from said associated monetary credit.

Preferably said system further including means for terminating said call if user has no associated monetary credit left.

In a third embodiment, the present invention consists in software for affecting the above methods.

In a fourth embodiment, the present invention consists in storage media containing software affecting the above methods.

This invention may also be said broadly to consist in the parts, elements and features referred to or indicated in the specification of the application, individually or collectively, and any or all combinations of any two or more of said parts, elements or features, and where specific integers are mentioned herein which have known equivalents in the art to which this invention relates, such known equivalents are deemed to be incorporated herein as if individually set forth.

10 BRIEF DESCRIPTION OF DRAWINGS

A Voice Over Internet Protocol and Public Switched Telephone Network connecting system and method will be described with reference to the accompanying drawings in which: -

15 **Figure 1** is a schematic illustration of the system of the present invention;

Figure 2 is a flow diagram of the steps carried out by the system and method of the present invention; and

Figure 3 is an example of a Session Initiation Protocol invite packet as used by the present invention.

20 DETAILED DESCRIPTION OF THE INVENTION

Referring to Figure 1 the present invention relates to the provision of Public Switched Telephone Network interconnection services with Voice Over Internet Protocol calling networks. A user using a Session Initiation Protocol

user agent 101 of some sort, typically an Internet Protocol network connectable telephone, or analogue adapter connects in the usual manner to a Session Initiation Protocol proxy server 102. This would typically be a Voice Over Internet Protocol service provider. The user authenticates in the usual manner as provided for in RFC3261. In order to authenticate the user will typically be provided with a unique password. Once authenticated the call is passed to the system of the present invention 103. The connection device of the present invention 103 will then on connect the call to a Public Switched Telephone Network 105. The connection device of the present invention 103 will either include or have access to a data store 104, which allows for data such as authentication data and monetary balances to be stored. The data store 104 may be connected to the connecting device 103 over a network.

The interconnecting device 103 is connected to Internet Protocol networks and to the Public Switched Telephone Network. The interconnecting device 103 of the present invention can be implemented using a computer including at least one processor, memory, input and output devices, storage and network connectivity devices. Alternatively embedded processors could be used to implement the device of the present invention. Devices such as Internet Telephony switches or suitably programmed personal computers, which include support for the Session Initiation Protocol, would be suitable

Referring to Figure 2 the call process is as follows; the user using a user agent 101 authenticates 201 to a Session Initiation Protocol proxy 102. The Session Initiation Protocol proxy checks the authentication 202 and sends an invite message 203 to the system 103. The invite message includes information provided by the user when the user initiates the session with the proxy. A sample invite message is shown in Figure 3.

The system 103 receives the invite 204 and extracts information 205. The extracted information includes referring to Figure 3 the access code 305 and destination telephone number 306 from the proxies 102 invite "To" header field. Additionally the system 103 extracts the originating subscriber Session Initiation Protocol number 304, Voice Over Internet Protocol providers Session Initiation Protocol proxy Internet Protocol address 311 and the Fully Qualified Domain Name 307.

The connecting system 103 then checks that the Session Initiation Protocol proxies Internet Protocol address 311 is valid, the address having been previously added to the systems data store. The connecting system 103 then authenticates 206 the subscriber/user 101 using the subscribers Session Initiation Protocol number 310 and the previously obtained Session Initiation Protocol proxies Internet Protocol address 311 and Fully Qualified Domain Name 304. These having been previously stored for authentication in the systems 103 data store 104.

In an alternative embodiment further authentication is performed using the Public Switched Telephone Network access code 305 obtained from the proxies invite "To" header field 312.

If authentication is successful the connecting system 103 using a network accessible accounting database or checking with a network connected call accounting system the system 103 will check if the subscriber 101 has sufficient credit 207 and if so 210 connect the call 211.

To check if there is sufficient credit the system 103 will use the originating subscriber Session Initiation Protocol number 310. Preferably the call charges are deducted from the subscribers credit by calculating the charge based on the destination number.

If there is insufficient credit 208 the call is terminated 209 by the system 103.

5 Further in an alternative embodiment the call is terminated once the users credit has been used. In order to do this, the system 103 calculates the calling charges incurred and if these exceed the users credit the call is terminated. In a further alternative embodiment the user is provided with a prompts to enable the user to increase their credit using for example a credit card during the call.

10 The foregoing description of the preferred embodiment of the invention has been presented for purposes of illustration and description. It is not intended to be exhaustive or to limit the invention to the precise forms disclosed, since many modifications or variations thereof are possible in the light of the above teaching. All such modifications and variations are within the scope of the invention. The embodiments described herein were chosen
15 and described in order best to explain the principles of the invention and its practical application, thereby to enable others skilled in the art to utilise the invention in various embodiments and with various modifications as are suited to the particular use contemplated thereof. It is intended that the scope of the invention be defined by the claims appended hereto, when interpreted in
20 accordance with the full breadth to which they are legally and equitably suited.

CLAIMS

1. A method of connecting a Voice Over Internet Protocol call with a Public Switched Telephone Network including the steps of:

receiving a Session Initiation Protocol invite from a Session Initiation
5 Protocol proxy;

extracting from said Session Initiation Protocol invite call destination
codes;

further extracting from said Session Initiation Protocol invite a
subscribers Session Initiation Protocol number, said Session Initiation Protocol
10 proxies Internet Protocol address and said Session Initiation Protocol proxies
Fully Qualified Domain Name;

authenticating Voice Over Internet Protocol caller by comparing said
extracted subscribers Session Initiation Protocol number, Session Initiation
Protocol proxies Internet Protocol address and Session Initiation Protocol
15 proxies Fully Qualified Domain Name with previously stored data; and

connecting said Voice Over Internet Protocol and Public Switched
Telephone Network if said comparisons match and said extracted subscribers
Session Initiation Protocol number has an associated monetary credit.

2. A method of connecting a Voice Over Internet Protocol call with a
20 Public Switched Telephone Network as claimed in claim 1 further including
the steps of:

extracting from said Session Initiation Protocol invite an access code;
and

further authenticating said call by comparing said extracted access code
with previously stored data.

5 3. A method of connecting a Voice Over Internet Protocol call with a
Public Switched Telephone Network as claimed in claim 1 or claim 2 further
including the step of accounting for the cost of the call and deducting said cost
from said associated monetary credit.

10 4. A method of connecting a Voice Over Internet Protocol call with a
Public Switched Telephone Network as claimed in claim 3 further including
the step of terminating said call if user has no associated monetary credit left.

5. A system for connecting a Voice Over Internet Protocol call with a
Public Switched Telephone Network including:

15 means for receiving a Session Initiation Protocol invite from a Session
Initiation Protocol proxy;

means for extracting from said Session Initiation Protocol invite call
destination codes;

20 means for further extracting from said Session Initiation Protocol invite
a subscribers Session Initiation Protocol number, said Session Initiation
Protocol proxies Internet Protocol address and said Session Initiation Protocol
proxies Fully Qualified Domain Name;

means for authenticating Voice Over Internet Protocol caller by
comparing said extracted subscribers Session Initiation Protocol number,

Session Initiation Protocol proxies Internet Protocol address and Session Initiation Protocol proxies Fully Qualified Domain Name with previously stored data; and

5 means for connecting said Voice Over Internet Protocol and Public Switched Telephone Network if said comparisons match and said extracted subscribers Session Initiation Protocol number has an associated monetary credit.

6. A system for connecting a Voice Over Internet Protocol call with a Public Switched Telephone Network as claimed in claim 5 further including:

10 means for extracting from said Session Initiation Protocol invite an access code; and

means for further authenticating said call by comparing said extracted access code with previously stored data.

7. A system for connecting a Voice Over Internet Protocol call with a
15 Public Switched Telephone Network as claimed in claim 5 or claim 6 further including means for accounting for the cost of the call and deducting said cost from said associated monetary credit.

8. A system for connecting a Voice Over Internet Protocol call with a
20 Public Switched Telephone Network as claimed in claim 7 further including means for terminating said call if user has no associated monetary credit left.

9. Software for affecting the method of any one of claims 1 to 4.

10. Storage media containing software for affecting the method of any one of claims 1 to 4.

AMENDED CLAIMS

[received by the International Bureau on 16 August 2005 (16.08.2005)]

1. A method of connecting a Voice Over Internet Protocol call with a Public Switched Telephone Network, said method providing one stage connection, authentication and prepayment for the interconnection, said method
5 including the steps of:

receiving a Session Initiation Protocol invite from a Session Initiation Protocol proxy;

extracting from said Session Initiation Protocol invite call destination codes;

10 further extracting from said Session Initiation Protocol invite a subscribers Session Initiation Protocol number, said Session Initiation Protocol proxies Internet Protocol address and said Session Initiation Protocol proxies Fully Qualified Domain Name;

15 authenticating Voice Over Internet Protocol caller by comparing said extracted subscribers Session Initiation Protocol number, Session Initiation Protocol proxies Internet Protocol address and Session Initiation Protocol proxies Fully Qualified Domain Name with previously stored data; and

20 connecting said Voice Over Internet Protocol and Public Switched Telephone Network if said comparisons match and said extracted subscribers Session Initiation Protocol number has an associated monetary credit.

2. A method of connecting a Voice Over Internet Protocol call with a Public Switched Telephone Network as claimed in claim 1 further including the steps of:

extracting from said Session Initiation Protocol invite an access code;
and

further authenticating said call by comparing said extracted access code
with previously stored data.

5 3. A method of connecting a Voice Over Internet Protocol call with a
Public Switched Telephone Network as claimed in claim 1 or claim 2 further
including the step of accounting for the cost of the call and deducting said cost
from said associated monetary credit.

10 4. A method of connecting a Voice Over Internet Protocol call with a
Public Switched Telephone Network as claimed in claim 3 further including
the step of terminating said call if user has no associated monetary credit left.

15 5. A system for connecting a Voice Over Internet Protocol call with a
Public Switched Telephone Network, said system providing one stage
connection, authentication and prepayment for the interconnection, said system
including:

means for receiving a Session Initiation Protocol invite from a Session
Initiation Protocol proxy;

means for extracting from said Session Initiation Protocol invite call
destination codes;

20 means for further extracting from said Session Initiation Protocol invite
a subscribers Session Initiation Protocol number, said Session Initiation
Protocol proxies Internet Protocol address and said Session Initiation Protocol
proxies Fully Qualified Domain Name;

means for authenticating Voice Over Internet Protocol caller by comparing said extracted subscribers Session Initiation Protocol number, Session Initiation Protocol proxies Internet Protocol address and Session Initiation Protocol proxies Fully Qualified Domain Name with previously stored data; and

means for connecting said Voice Over Internet Protocol and Public Switched Telephone Network if said comparisons match and said extracted subscribers Session Initiation Protocol number has an associated monetary credit.

6. A system for connecting a Voice Over Internet Protocol call with a Public Switched Telephone Network as claimed in claim 5 further including:

means for extracting from said Session Initiation Protocol invite an access code; and

means for further authenticating said call by comparing said extracted access code with previously stored data.

7. A system for connecting a Voice Over Internet Protocol call with a Public Switched Telephone Network as claimed in claim 5 or claim 6 further including means for accounting for the cost of the call and deducting said cost from said associated monetary credit.

8. A system for connecting a Voice Over Internet Protocol call with a Public Switched Telephone Network as claimed in claim 7 further including means for terminating said call if user has no associated monetary credit left.

9. Software for affecting the method of any one of claims 1 to 4.

1/3

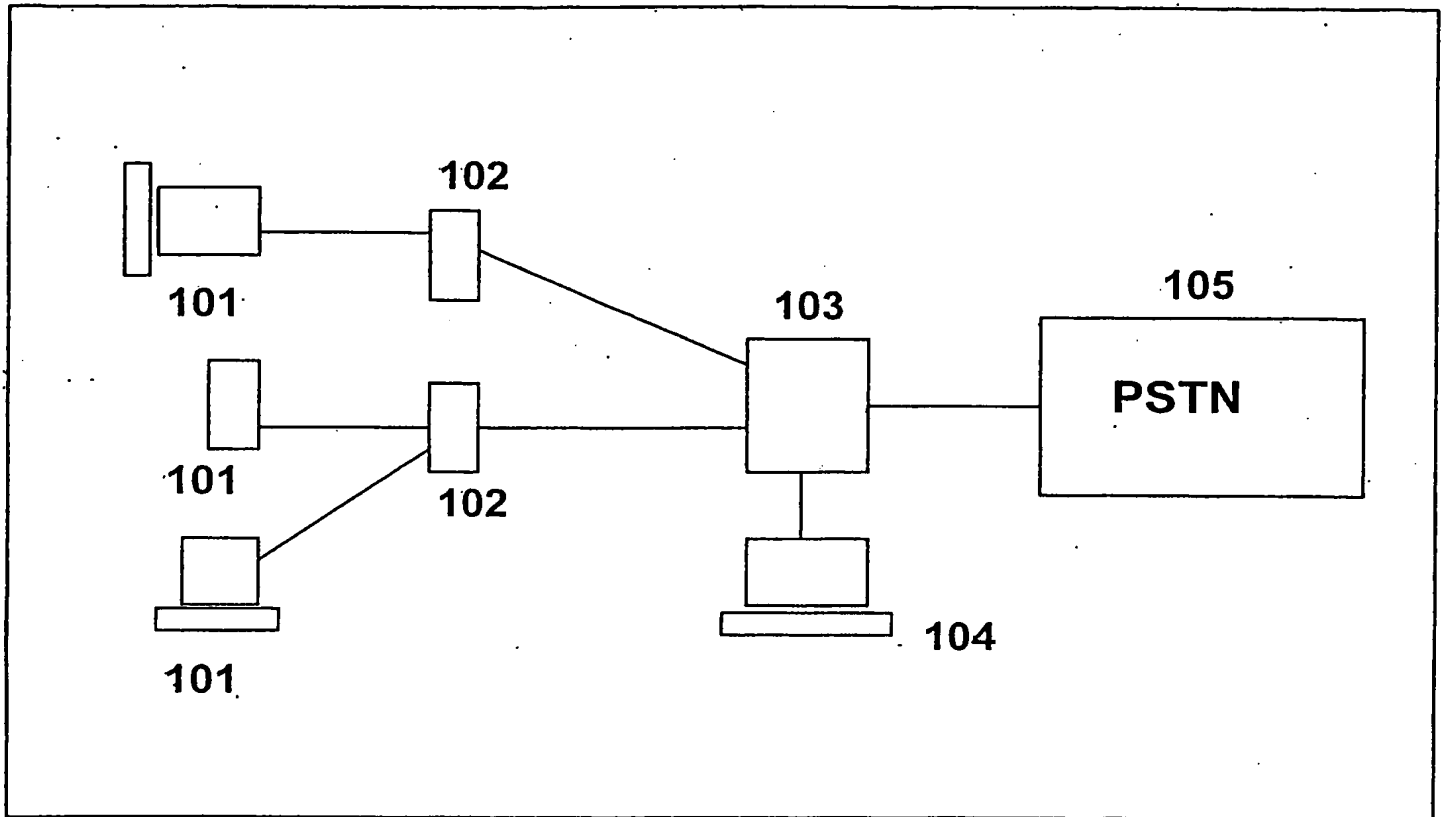
Figure 1

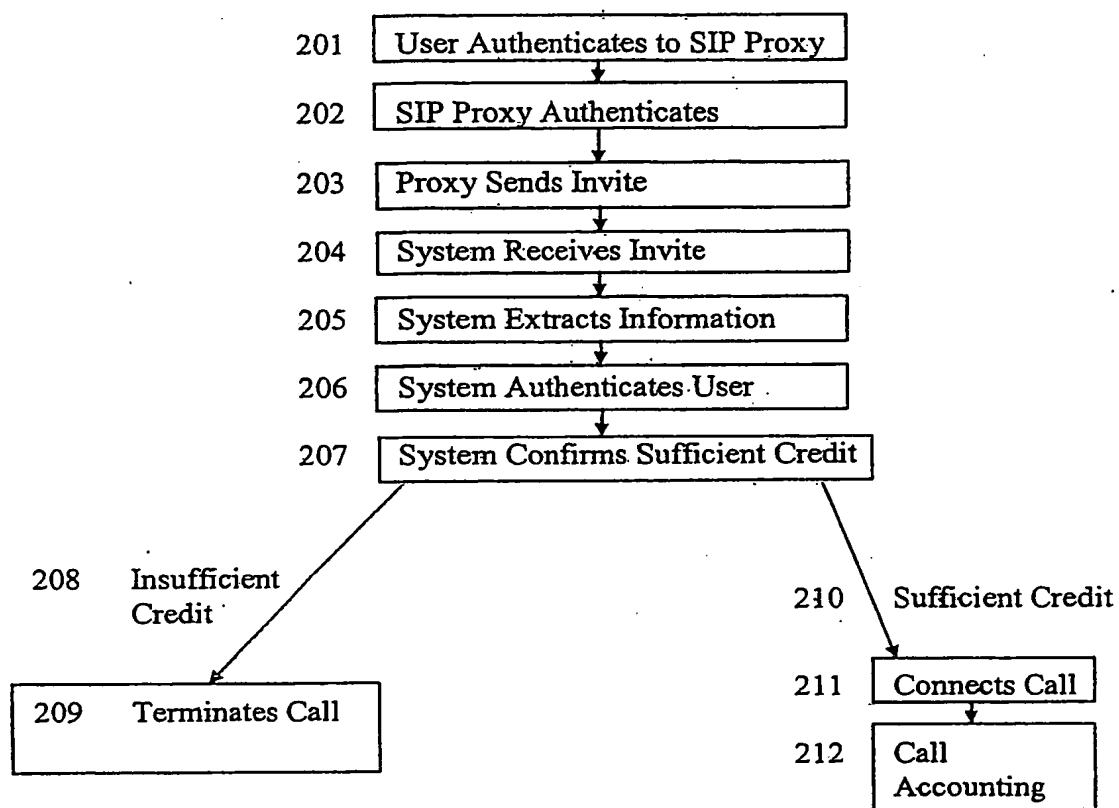
Figure 2

Figure 3

SIP INVITE message.. 301

INVITE sip:access_code+destination_number@10.10.200.11 SIP/2.0 302

Via: SIP/2.0/UDP proxy_ip_address:5060 311 303

From: "originating_number" <sip: originating_number@sip_provider_fqdn> 310 304

To: <sip: access_code+destination_number@10.10.200.11> 312 305 306

Call-ID: c2943000-6994e7-aec7584-312e3031@sip_provider_fqdn 307

CSeq: 101 INVITE

Expires: 180

User-Agent: Cisco IP Phone/ Rev. 1/ SIP enabled

Accept: application/sdp

Contact: sip: originating_number@sip_provider_fqdn:5060

Content-Type: application/sdp

Content-Length: 170

INTERNATIONAL SEARCH REPORT

International application No.

PCT/SG2005/000101

A. CLASSIFICATION OF SUBJECT MATTER

Int. Cl. ⁷: H04L 12/66, 29/06, 9/32, H04M 11/06

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

Derwent WPAT, Espacenet, USPTO: VOIP, phone, call, connection, PSTN, authentication, verify, session, protocol and similar terms

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	WO 2002/023851 A2 (VECTONE LIMITED) 21 March 2002 whole document	
A	US 2003/0012159 A1 (VASSILOVSKI et al) 16 January 2003 whole document	
A	WO 2002/076076 A1 (WORLDCOM, INC) 26 September 2002 whole document	
A	CA 2310936 A1 (AG COMM SYSTEMS CORPORATION, US) 26 May 2001 whole document	

☒ Further documents are listed in the continuation of Box C☒ See patent family annex

* Special categories of cited documents:	"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"A" document defining the general state of the art which is not considered to be of particular relevance	"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"E" earlier application or patent but published on or after the international filing date	"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	"&" document member of the same patent family
"O" document referring to an oral disclosure, use, exhibition or other means	
"P" document published prior to the international filing date but later than the priority date claimed	

Date of the actual completion of the international search
9 June 2005

Date of mailing of the international search report

16 JUN 2005

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C (Continuation).

DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	ROY CHAOMING HSU et al, "An Embedded Software Approach for the Development of SIP-Based VOIP Server", Proceedings of the 11th Asia-Pacific Software Engineering Conference (ASPEC '04), IEEE Computer Society, pp 688-694, 30 November - 3 December 2004, ISBN 0769522459	

INTERNATIONAL SEARCH REPORT

International application No.

Information on patent family members

PCT/SG2005/000101

This Annex lists the known "A" publication level patent family members relating to the patent documents cited in the above-mentioned international search report. The Australian Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

Patent Document Cited in Search Report		Patent Family Member	
WO	2002/023851	AU	87849/01
US	2003/0012159	US	6845092
WO	2002/076076	BR	0208196
		EP	1374549
CA	2310936	NONE	
Due to data integration issues this family listing may not include 10 digit Australian applications filed since May 2001.			
END OF ANNEX			